FIELD MOUNTED CONTROLS

COMMON INSTRUMENTATION DEVICES

TEMPERATURE SENSOR

HUMIDITY SENSOR

PRESSURE SENSOR

[F] DUCT SMOKE DETECTOR

(T) SPACE THERMOSTAT

(H) SPACE HUMIDISTAT

 $(\underline{T})_A$ ASPIRATING THERMOSTAT

NIGHT CYCLE CONTROL THERMOSTAT

Thermostat with insulating base

SINGLE LINE-HARD DOUBLE LINE-HARD OR FLEXIBLE DUCT DUCT REHEAT COIL FLEXIBLE CONNECTION OR FLEXIBLE CONNECTION DUCT FLEXIBLE CONNECTION ACCESS DOOR POINT OF CHANGE IN DUCT CONSTRUCTION DUCT CONSTRUCTION BY PRESSURE CLASS ROUND **MISCELLANEOUS** POINT OF NEW — VIBRATION ISOLATOR CONNECTION TO EXISTING **SPECIAL DESIGNATION** MOUNT) DETAIL REFERENCE (TOP=DETAIL NO., EQUIPMENT (PUMP INDICATED) BOTTOM=DRAWING NO. SHOWN ON) **DIFFUSER NOTATION** DUCT SIZE IN INCHES (I.E. GAUGE FILTER, ETC.) DETAIL REFERENCE (TOP= (NET INSIDE DIMENSIONS) DETAIL NO., BOTTOM=SHEET NO. IN DETAIL MANUAL) (ROUND SHOWN) INDICATES ROUND PLAN CONTINUATION REFERENCE O-INDICATES OVAL. REVISION REFERENCE FIRST FIGURE: SIDE SHOWN SECOND FIGURE: SIDE NOT SHOWN — \{10□ SA → GENERAL OR SPECIAL SECTION DESIGNATION SUPPLY AIR DUCT NOTES REFERENCE (TOP DESIGNATES SECTION NUMBER, DIFFUSER AIR PATTERN BOTTOM DESIGNATES ON WHICH 1 ARROW: 1 WAY SHEET SECTION APPEARS) 102 ROOM NUMBER DESIGNATION 2 ARROWS: 2 WAY 3 ARROWS: 3 WAY MATCHLINE DESIGNATION 4 ARROWS: 4 WAY <1001> CONSTRUCTION BULLETIN NO ARROWS: 4 WAY REVISION NUMBER **GRILLE, REGISTER NOTATION** EXHAUST AIR DUCT. RETURN AIR DUCT (RA) **VALVES** 12x6 EA 12x6 G-1 250 BUTTERFLY VALVE DRAIN VALVE DUCT SIZE IN INCHES (NET INSIDE DIMENSIONS) GATE VALVE DRAIN VALVE WITH CAP FIRST FIGURE: SIDE SHOWN SECOND FIGURE: SIDE NOT SHOWN — ⊳ GLOBE VALVE **─**───**⋝** LOCKSHIELD VALVE —⊢Ó⊢— BALL VALVE PRESSURE REDUCING VALVE-PRV SHUTOFF VALVE (BUTTERFLY VALVE FOR 2 1/2" AND (DOWNSTREAM SETPOINT) LARGER. BALL VALVE FOR 2" AND SMALLER) AIR-LOADED PRESSURE REDUCING VALVE-PRV GAUGE VALVE (DOWNSTREAM SETPOINT) **DUCTWORK** —— PLUG VALVE → BALANCING VALVE PRESSURE REDUCING VALVE-PRV <u>SINGLE</u> **DOUBLE** (UPSTREAM SETPOINT) THERMAL EXPANSION VALVE GAS REGULATOR SPRING CHECK VALVE ROUND/ROUND BRANCH TAKE-OFF REDUCED PRESSURE SWING CHECK VALVE BACKFLOW PREVENTER (RPBP) OR DIAPHRAGM VALVE __BFP__ R=1.5W -2-WAY SOLENOID VALVE PRESSURE RELIEF VALVE (RV) 2-WAY CONTROL VALVE (VALVE BODY AS SPECIFIED) OR SAFETY VALVE (SV) SQUARE ELBOW 3-WAY MIXING VALVE WITH ARROW INDICATING FAIL POSITION VACUUM RELIEF/VACUUM BREAKER 45°LATERAL BRANCH 3-WAY DIVERTING VALVE WITH RUPTURE DISK PRESSURE RELIEF ARROW INDICATING FAIL POSITION **RUPTURE DISK** VACUUM RELIEF TRIPLE DUTY VALVE R=1.5W -FLOAT OPERATED VALVE GAS SHUTOFF VALVE SQUARE TEE QUICK OPENING VALVE $\longrightarrow \bowtie$ ANGLE VALVE (FOR LOW PRESSURE SA DIVERGING ONLY) (XX) = DEFINES FAIL POSITION OR NORMAL POSITION (FC) = FAIL CLOSED (CONTROL VALVE OR DAMPER) **BULLHEAD TEE** (FO) = FAIL OPEN (CONTROL VALVE OR DAMPER) (FOR LOW PRESSURE SA DUCTWORK ONLY) (NC) = NORMALLY CLOSED (CONTROL VALVE OR DAMPER) (NO) = NORMALLY OPEN (CONTROL VALVE OR DAMPER) -15°MAX. FOR DIVERGING, 25°MAX FOR CONVERGING TRANSITION - ECCENTRIC -15°MAX. FOR DIVERGING, 25°MAX FOR CONVERGING TRANSITION - CONCÉNTRIC ——<u>]</u> MANUAL BALANCING DAMPER SMOKE DAMPER EXISTING DUCT TO REMAIN _ _ _ _ _ CONTROL DAMPER COMBINATION FIRE/SMOKE DAMPER BACKDRAFT DAMPER OPPOSED BLADE DAMPER EXISTING DUCT TO BE REMOVED PARALLEL BLADE DAMPER 3 HOUR RATED FIRE DAMPER LINE CONTINUATION BREAK (RECTANGULAR, ROUND) 1 1/2 HOUR RATED FIRE DAMPER -|**/**-| GENERAL SUPPLY AIR (SA) OR OUTDOOR AIR (OA) DUCT (SOLID LINE WITH FILL OR HATCH TYPICAL (XX) = DEFINES FAIL POSITION OR NORMAL POSITION FOR SUPPLY AND OUTDOOR AIR UP, BROKEN (FC) = FAIL CLOSED (CONTROL VALVE OR DAMPER) (FO) = FAIL OPEN (CONTROL VALVE OR DAMPER) (NC) = NORMALLY CLOSED (CONTROL VALVE OR DAMPER) RETURN AIR (RA), RELIEF AIR, OR (NO) = NORMALLY OPEN (CONTROL VALVE OR DAMPER) TRANSFER AIR (TA) DUCT (SOLID LINE WITH FILL OR HATCH TYPICAL FOR RETURN, RELIEF AND TRANSFER AIR UP, BROKEN LINE DOWN) EXHAUST AIR (EA) DUCT $\overline{}$ (SOLID LINE WITH FILL OR HATCH TYPICAL FOR EXHAUST AIR UP, BROKEN LINE DOWN) **ACTUATORS** DUCT RISE/DROP W/90°ELBOWS MANUAL ELECTRIC MOTOR DRIVEN (SUPPLY RECTANGULAR DUCT SHOWN) **GENERAL** TWO POSITION DUCT RISE (R)/DROP(D) W/45°ELBOWS SPRING RETURN (RECTANGULAR DUCTS) MODULATING DOUBLE ACTING TWO POSITION DUCT RISE/DROP W/90°ELBOWS MODULATING WITH (ROUND DUCTS) PILOT POSITIONER FUSIBLE LINK

MECHANICAL SYMBOLS AND ABBREVIATIONS

APPLY TO THIS PROJECT. ADDITIONAL SYMBOLS MAY BE INDICATED IN THE CONTRACT

NOTE: SYMBOLS INDICATED HERE AND NOT USED IN THE CONTRACT DOCUMENTS DO NOT

DOCUMENTS.

DUCTWORK SPECIALTIES

SOLENOID

PIPING SYSTEM LABELS DUCTWORK AT DIFFUSERS AND GRILLES ─ IA(XX) — INSTRUMENT AIR — BF—— BOILER FEED BBD BOILER BLOW DOWN —JWR — JACKET WATER RETURN − CA(XX) — COMPRESSED AIR — JWS — JACKET WATER SUPPLY SUPPLY DIFFUSER OR GRILLE — CCC — CONDENSATE COOLING COIL — LP — LIQUIFIED PETROLEUM GAS (HORIZONTAL MOUNT) — CHS — CHILLED WATER SUPPLY —LOR — LUBRICATION OIL RETURN — CHR — CHILLED WATER RETURN — LOS — LUBRICATION OIL SUPPLY — CPD — CONDENSATE PUMP DISCHARGE — LPS— LOW PRESSURE STEAM ——D—— DRAIN — LPC — LOW PRESSURE CONDENSATE DIFFUSER —DCW— DOMESTIC COLD WATER —LTWS — LOW TEMPERATURE WATER SUPPLY — FS — FUEL SUPPLY —LTWR — LOW TEMPERATURE WATER RETURN RETURN REGISTER OR — FR — FUEL RETURN ——NG—— NATURAL GAS GRILLE (HORIZONTAL MOUNT) — FOF — FUEL OIL FILL —NPCW — NON-POTABLE COLD WATER **EXHAUST REGISTER OR GRILLE** — FOG — FUEL OIL GAUGE —PCWR— PROCESS COOLING WATER RETURN (HORIZONTAL MOUNT) —PCWS— PROCESS COOLING WATER SUPPLY — FOR — FUEL OIL RETURN — FOS — FUEL OIL SUPPLY PHWR— PREHEAT WATER RETURN EXHAUST OR RETURN — FOV — FUEL OIL VENT — PHWS — PREHEAT WATER SUPPLY REGISTER OR GRILLE (VERTICAL MOUNT) — RL— REFRIGERANT LIQUID —— G —— LOW PRESSURE GAS SUPPLY REGISTER OR —GWR— GLYCOL WATER RETURN GRILLE (VERTICAL —GWS— GLYCOL WATER SUPPLY — RHG — REFRIGERANT HOT GAS — HPC — HIGH PRESSURE CONDENSATE RWR - RECLAIM WATER RETURN - HPG(XX) - HIGH PRESSURE GAS RWS - RECLAIM WATER SUPPLY —TWR — TOWER WATER RETURN HPS(XX) – HIGH PRESSURE STEAM —TWS — TOWER WATER SUPPLY —HRR — HEAT RECOVERY RETURN HRS HEAT RECOVERY SUPPLY NECK SIZE IN INCHES —HWR— HEATING HOT WATER RETURN —HWS— HEATING HOT WATER SUPPLY (XX) = SYSTEM PRESSURE IN PSIG - CEILING DIFFUSER (CD) IDENTIFICATION - AIR QUANTITY (CFM) **PIPING SPECIALTIES** GENERAL PIPELINE ———— FILTER/REGULATOR STRAINER WITHOUT DRAIN GENERAL PIPELINE STRAINER WITH DRAIN THERMOMETER STEAM & CONDENSATE PRESSURE GAUGE PIPELINE STRAINER (WITH GAUGE VALVE) - NECK SIZE IN INCHES ———— FLOW SENSOR WATER SYSTEM RETURN OR EXHAUST GRILLE PIPELINE STRAINER ———— FLOW SWITCH (G) SUPPLY GRILLE (SG) SUCTION DIFFUSER LINEAR DIFFUSER (LD) AUTOMATIC AIR VENT LINEAR RET/EXH GRILLE (LG) TRANSFER GRILLE (TG) MANUAL AIR VENT BASKET STRAINER THERMOSTATIC AIR VENT - AIR QUANTITY (CFM) ——∣⊢— UNION TEST PLUG (PRESSURE/TEMP.) 2" AND SMALLER, CAP OR PLUG CONCENTRIC OR ECCENTRIC REDUCER 2-1/2" AND LARGER, BLIND FLANGE ——— CONCENTRIC REDUCER —— INVERTED BUCKET TRAP ——— FLOAT AND THERMOSTATIC TRAP ECCENTRIC REDUCER ──────── THERMOSTATIC TRAP EXPANSION JOINT PIPE FLEXIBLE CONNECTION RECTANGULAR/ROUND BRANCH TAKE-OFF BALL JOINT NOISE SUPPRESSOR

DUCT RISE/DROP W/90°ELBOWS

(ROUND OR OVAL DUCTS)

DUCT RISE(R)/DROP(D) W/45°ELBOWS

(OVAL DUCTS)

		DIRECTION OF PITCH (DOWN)	SEALS AND SIGNATURES
		DIRECTION OF FLOW	
TION		PIPE GUIDE	
		PIPE SLEEVE	WITT P. FOOM
	×	ANCHOR	D62-059117 LICENSED PROFESSIONAL OF OF OF EXPIRES 11-30
<u>PIPING</u>			
DOUBLE			
	ELBOW DOWN		

ELBOW UP

BOTTOM CONNECTION

(REFER TO SPECIFICATION FOR

SIDE, TOP OR BOTTOM TEE)

(45°OR 90°)

CONNECTION

(45°OR 90°)

45°PIPE

RISE(R)

/DROP(D)

S EXISTING PIPING TO REMAIN

EXISTING PIPING

TO BE REMOVED

_____ LINE CONTINUATION BREAK

TOP

<u>SINGLE</u>

ISSUED FOR CONSTRUCTION BY APVD DATE REV. NO. DESCRIPTION NATIONAL LABORATORY Facilities Management Services PROJECT TITLE ADVANCED PROTEIN CRYSTALLIZATION FACILITY,

ARGONNE NATIONAL LABORATORY

A/E CADD FILE M00.00 A/E DWG. NO.

M00.00

DWG STATE

BIND ORDER

CAD NO:

MECHANICAL SYMBOLS

AND ABBREVIATIONS

SMITHGROUP

SUITE 2200

T 312.641.0770

F 312.641.6728

SMITHGROUP, INC

35 EAST WACKER

CHICAGO, IL 60601

www.smithgroup.com

landscape architi planning urban design civil engineering environmental sc

Affiliated Engineers, Inc.

5802 Research Park Boulevard

Thornton Tomasetti

330 N. Wabash Avenue, Suite 1500

T 312.596.2000 **F** 312.596.2001

TERRA

225 West Ohio Street, 4th Floor

Chicago, Illinois 60654 T:(312)467-0123 F:(312) 467-0220

Madison, Wisconsin 53719 Tel 608.238.2616 Fax 608.238.2614

Thornton Tomasetti, Inc.

Chicago IL 60611-7622

architecture engineering interiors planning

35 EAST WACKER DRIVE

CHICAGO, ILLINOIS 60601

SUITE 2200

312.641.0510 T

312.641.0668 F

www.jjr-us.com

ANL - JESSE ADAMS DATE - 04/26/11

PROJECT MANAGER

DRAWN

CHECKED

SPF

PROJECT NO 08541-00

DRAWING TITLE

FACILITY DOCUMENT NUMBER J446-101-W-